REMARKS

Claims 1-9, 11-86, 88-94, and 105 are pending in the present application. The Examiner has rejected of claims 1-9, 11-86, 88-94 and 105 under 35 U.S.C. §103(a). Applicant has amended claims 2 and 55. No new matter was introduced.

Section 103 Rejections

Claims 1-9, 11-29, 33-45, 47, 49-51, 53, 55-80, 84-86, 88-94, and 105 were rejected under 35 U.S.C. §103(a) as being obvious over Abreu, *et al.*, "Video-Based Multi-Agent Traffic Surveillance System", Proceedings of the IEEE 2000 Intelligent Vehicles Conference, 4-5 October 2000, pgs. 457-462 (VM), in view of U.S. Patent Application Publication No. 2007/0154067 (Laumeyer, *et al.*) and U.S. Patent No. 5,761,326 (Brady, *et al.*).

Claims 30-32, 46, 48, 52, 54, and 81-83 were rejected under 35 U.S.C. §103(a) as being obvious over VM.

Applicant urges that at the very least, the combination of VM, Laumeyer, and Brady fails to disclose or suggest Applicant's *method for detecting one or more objects belonging to the same object class* that includes *applying one or more classifiers to detect components of objects in an image frame in the video sequence, wherein the component classifiers include classifiers for detecting object components of different sizes at multiple scales* and *wherein said method is adapted for detecting moving and stationary objects from a moving video camera,* as essentially recited in claims 1, 49, and 105.

In the Response to Arguments section of the Action, the Examiner states that Applicant's arguments have been considered but were moot in view of new grounds of rejection. However, the only new ground of rejection presented was that over Brady, as the Examiner otherwise repeated her earlier rejections over VM and Laumeyer, and has not otherwise responded to Applicant's arguments.

As discussed in Applicant's responses submitted on December 6, 2007, April 18, 2008, and October 22, 2008, VM is directed to a video-based traffic surveillance system using stationary cameras placed along a highway. In VM, the area being monitored remains the same and thus VM deals with a static background scene of the same area. Applicant's method is *adapted for detecting moving and stationary objects from a moving video camera.* VM uses a change detector to detect moving objects (e.g. vehicles) from a background scene. A change detector cannot be used with a moving camera, because the background is not static, as the image scenes captured by the camera are continuously changing. Applicant's method uses a classifier to determine if a vehicle is detected from a moving video camera. The Examiner acknowledged that VM fails to teach a method adapted for use with a moving video camera, but then cites Laumeyer as disclosing this limitation.

Laumeyer is directed to the identification of objects depicted in one or more image frames of a video stream. In particular, Laumeyer discloses building a database of road signs by processing images of roadside scenes obtained from a moving vehicle.

The Examiner cited Brady for teaching a method for traffic detection, monitoring, management, and vehicle classification and tracking, alleging that Brady's method of shrinking for tracking a vehicle as it is moving away from the detection camera reads on Applicant's claims recitation of detecting object components of different sizes at multiple scales.

Applicant respectfully disagrees with the Examiner's interpretation of VM, Laumeyer, and Brady.

The Examiner alleges that VM teaches detecting object components of different sizes, citing VM pg. 459, left column, lines 26-29, stating that "VM clearly shows the matching of an observed size of a mobile object with a previously gathered size of the object in order to classify the object observed." Applicant respectfully disagrees with the Examiner. The cited section of VM states that "classification methods are based on the matching of the observed size of a mobile object with previously gathered information of

typical sizes for objects of all classes". This section only addresses matching a size of a whole object, and does not address detecting object parts of different sizes, whereas Applicant's claims 1 and 63 recite using a number of component classifiers to detect object components of different sizes at multiple scales. The Examiner's allegation that VM teaches detecting object components of different sizes is an improper application of hindsight acquired from Applicant's disclosure onto the VM disclosure.

The Examiner alleged that Laumeyer further discloses detecting pedestrians in a video stream, and that pedestrians are moving objects. Applicant respectfully disagrees with the Examiner. Laumeyer's disclosure is directed to describing how road signs can be recognized in a video stream using rules regarding their appearance (pp. [0059]). The only reference to a pedestrian in Laumeyer's disclosure is a sentence in pp. [0059], "Furthermore, pedestrian, cycle, and RV path signage identification may likewise benefit from the present invention." There is no disclosure in Laumeyer of how pedestrians, cycles, and RV path signs would be recognized, given the differences in appearance from road signs, thus Applicant urges that this sentence is not enabling for the identification of pedestrians. In addition, this sentence does not indicate whether the pedestrians are moving or stationary. The rest of Laumeyer's disclosure concerns the detection of stationary signs, and does not enable the detection of moving objects. Furthermore, this sentence could also be interpreted as not referring to the detection of pedestrians, cycles, and RV path signs at all, but to detecting signs for pedestrians, cycles, and RV paths. This interpretation is enabled by Laumeyer's disclosure. Thus, Applicant urges that Laumeyer does not disclose a method *adapted for detecting moving and stationary objects from a moving video camera*, as recited in claims 1, 49, and 105.

Further regarding claim 105, the Examiner cites Laumeyer, paragraph [0056] as disclosing classifying a detected object based on color and shape. As noted in Applicant's response filed on November 25, 2008, Laumeyer nowhere discloses the use of classifiers to identify signs in video streams, but rather uses subjectively defined image features and image filters to segment objects. The cited section of Laumeyer states "a color data set can begin as a single pixel of a recognizable color belonging to the subset of acceptable road sign colors and the morphology principles are used to determine shape

based on at least a four (4) pixel height and an ten (10) pixel width." Paragraph [0016] discloses other preselected features used to perform classification, such as frequency and spatial domain transformation, edge domain transformation, color transformation, and aspect ratio. There is no teaching or suggestion in paragraph [0056] or anywhere else in Laumeyer of *one or more classifiers include overlapping component classifiers*, as recited in claim 105, and the Examiner's allegation that color and shape are considered overlapping classifiers because these describe a same object constitutes another improper application of hindsight acquired from Applicant's disclosure onto Laumeyer's disclosure. Futhermore, since Laumeyer does not disclose classifiers, Laumeyer cannot disclose overlapping component classifiers, since one derives from the other. What the Examiner characterizes as "overlapping component classifiers" is in fact just two different rules using presented features.

The Examiner cited Brady as disclosing classifiers for detecting object components of different sizes at multiple scales. Brady is directed to a machine vision system that acquires images from a plurality of roadway sites and processes the images by analyzing the intensities of edge elements within the image. Brady applies fuzzy set theory to the location and angles of each pixel after the pixel intensities have been characterized by vectors to classify vehicles. After classification, a vehicle can be tracked to predict potential future track points. The section cited by the Examiner discloses a graphical representation of the placement of potential future track regions in an image, and further discloses proportionately shrinking the moving object along the camera's line of sight. Proportionately shrinking a moving object does not teach or suggest *component classifiers [that] includes classifiers for detecting object components of different sizes at multiple scales*, as the object being shrunk has already been detected by application of fuzzy set theory. Furthermore, fuzzy sets are sets whose elements have degrees of membership, and the use of fuzzy set theory does not teach or suggest one or more component classifiers.

Thus, Brady does not rectify the deficiencies of VM and Laumeyer, discussed above, and thus Applicant urges that a *prima facie* case of obviousness against claims 1,

49, and 105 over VM, Laumeyer and Brady cannot be maintained. Reconsideration and withdrawal of these rejections are respectfully requested.

Claims 2-9, 11-29, 33-45, 47, 50-51, 53, 55-80, 84-86 and 88-94 all depend from either claim 1 or claim 49, are patentable for at least the same reasons as claims 1 and 49. Reconsideration and withdrawal of these rejections are respectfully requested.

Similarly, claims 30-32, 46, 48, 52, 54, and 81-83 all depend from either claim 1 or claim 49, are patentable for at least the same reasons as claims 1 and 49. Reconsideration and withdrawal of these rejections are respectfully requested.

Further regarding claim 2, the Examiner cited VM, page 459, left column, lines 22-25, as disclosing identifying the detected components to be an object of a particular object class. Applicant respectfully disagrees. VM's classifiers can distinguish cars, trucks, pedestrians, motorbikes, etc., and the classification has one of the following values: car, truck, motorbike, etc (see page 459, left column, lines 9-14). Applicant's object class classifiers separate objects of a particular class from background scenes, and the classification has one the following values: object of object class, not-object of object class.

In addition, the Examiner cited Examiner cited VM, page 459, left column, lines 26-29 as disclosing *applying whole-appearance classifiers an image patch that contains the detected components and which is aligned according to the position of the detected components . . . wherein the whole appearance classifiers detect entire or partial object appearance, the entire or partial object appearance being aligned according to positioning of at least two components*, as essentially recited in claims 5 and 9. Again, Applicant respectfully disagrees. The classification method disclosed in VM uses information of a typical object size to decide what type of an object that an moving target is, whereas the whole appearance classifier recited in claims 5 and 9 uses appearance information to decide whether or not an image patch contains an object of a particular object class.

Regarding claim 11, the Examiner alleges that VM teaches the use of classifiers, citing pg. 459, left column, lines 37-38. Applicant respectfully disagrees. The cited section of VM states that the "adaptation of the class templates is based on well known algorithms for competitive learning", citing S. Haykin, Neural Networks: A Comprehensive Foundation, Prentice Hall, 1999. Thus, VM discloses the use of neural networks, and does not disclose the use of classifiers trained by boosting.

Regarding claim 20, which also recites that *the one or more classifiers include overlapping component classifiers*, the Examiner cited VM, pg. 461, Fig. 4 and pg. 462, left column, lines 3-8 as disclosing this limitation. This section of VM discloses how one can infer a 3D shape from a 2D extracted object assuming plane motion and rigid objects. From the resulting cloud of 3D points a 3D size (a bounding box), position and speed are inferred, and Fig. 4 depicts typical results. The Examiner seems to confuse Fig. 4 with the real image appearance, i.e. real pixel values in an image area which is being processed by the methods of claims 1 and 105. VM does not detect any object components, and the bounding box is a sketch made to enclose an image area where a moving object has been detected by a change detector. In addition, the Examiner alleges that "the overlapping component mat be the different information extracted from the 3D information, since all information is based on a single object." Applicant urges that the Examiner appears to be making up her own definition of overlapping, since different information extracted from a same object need not be from overlapping components. Furthermore, the method outlined in VM (estimating a motion field within segmented object masks, determining the structure of the object without scale, and matching the corresponding shape with a 2D mask to yield scale information) nowhere teaches or suggests the use of *one or more classifiers include overlapping component classifiers.* Again, by inferring *overlapping component classifiers* from VM, the Examiner is again engaging in an improper application of hindsight acquired from Applicant's disclosure onto the VM disclosure.

Regarding claims 37 and 49, the Examiner alleged that VM teaches accumulating confidence scores across multiple frames using a recursive filter, alleging that the algorithm used to determine the next trajectory adjusts itself whenever new information is

received, thus making it repeat and re-occur, citing page 459, left-hand column, lines 49-50. Applicant respectfully disagrees. First, as noted above, since VM is directed to a video-based traffic surveillance system using stationary cameras placed along a highway, a stationary camera cannot track a detected object as a moving object will eventually pass out of the view of a stationary camera. The tracking performed by VM consists of matching a description of an object observed with one camera with an object description observed with a second camera (pg. 459, right column, lines 14-31). VM does not, and cannot, disclose a single moving cameras tracking a moving object, as recited in Applicant's claims 1, 49, and 105. Furthermore, the section of VM cited by the Examiner as disclosing this limitation, pg. 459, left column, line 49-50. The Examiner appears to confuse the concept of "trajectory" with "confidence scores". A confidence score is used to determine if an object has been detected. It is not a trajectory. Only after an object is detected does Applicant's method track the object over subsequent image frames, as recited in claims 40 and 90, and their respective dependent claims.

CONCLUSION

Applicant urges that claims 1-9, 11-86, 88-94, and 105, as amended, are in condition for allowance for at least the reasons stated. Early and favorable action on this case is respectfully requested.

Respectfully submitted,

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